

# Preseason Perceived Physical Capability and Previous Injury

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**Context:** Patient opinion about the ability to perform athletic maneuvers is important after injury; however, prospective assessment of self-perceived physical capability for athletes before the beginning of a season is lacking.

**Objective:** To perform a descriptive analysis of knee, shoulder, and elbow self-perceived measures of physical capability specific to athletics and to compare the measures between athletes with and without a history of injury.

**Design:** Cross-sectional study.

**Setting:** Preparticipation physical examinations.

**Patients or Other Participants:** A total of 738 collegiate athletes (486 men, 251 women; age =  $19 \pm 1$  years) were administered questionnaires after receiving medical clearance to participate in their sports. Of those athletes, 350 reported a history of injury.

**Main Outcome Measure(s):** Athletes self-reported a history of knee, shoulder, or elbow injury. Perceived physical capability of the 3 joints was evaluated using the Knee Injury and Osteoarthritis Outcome Score Sport and Recreation Function and Knee-Related Quality of Life subscales and the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score. We conducted nonparametric analysis to determine if scores differed between athletes with and without a history of injury.

**Results:** Median values for the Knee Injury and Osteoarthritis Outcome Score Sports and Recreation Function and Knee-Related Quality of Life subscales and the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score for all athletes were 100. Median values for perceived physical capability of athletes with a history of injury were 3 to 12 points lower for each questionnaire before the start of the season ( $P < .001$ ).

**Conclusions:** Our study provided descriptive values for individual perceived knee, shoulder, and elbow physical capability of collegiate athletes participating in 19 sports. Athletes who did not report previous injuries perceived their physical capabilities to be nearly perfect, which could set the goal for these athletes to return to participation after injury. Athletes reporting previous injuries perceived less physical capability before the competitive season. Self-assessment of joint-specific capability may supplement preseason physical examinations, identifying particular athletes needing further monitoring or care during a season.

**Key Words:** Knee Injury and Osteoarthritis Outcome Score, Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score, subjective outcomes

## Key Points

- Perceived physical capability specific to the knee, shoulder, and elbow was high for athletes before the competitive season.
- Athletes reporting previous injuries perceived less physical capability before the competitive season.
- Self-assessment of joint-specific capability may supplement preseason physical examinations and indicate that particular athletes need further monitoring or care during the season.

A patient's perception about his or her ability to perform physical maneuvers during either activities of daily living or more challenging tasks, such as those specific to athletic performance, has become an important piece of the medical-assessment process. In addition to routine clinical measures of motion and strength, accounting for *perceived physical capability* (the patient's opinion about his or her ability to perform athletic maneuvers at a specific point in time) has been theorized to contribute to the overall success of patient outcomes in rehabilitation because it integrates subjective information with objective measures specific to an individual patient.<sup>1–5</sup> Along with demonstrable clinical or performance maneuvers, an athlete's perceived physical capability to perform sport-specific tasks is an important consideration for

returning to active competition. When an injury occurs, the common goal for both athlete and clinician is to return the athlete to activity with at least the preinjury level of capability. Ideally, returning the athlete to the preinjury level of objective physical capabilities (demonstrable tasks) while accounting for subjective considerations (perceived tasks), in which the athlete perceives his or her level of physical capability and quality of life as restored relative to the injured structure, would assist clinicians in obtaining optimal outcomes through the use of integrated information.

Patient-oriented outcome measures have become a common component of injury assessment in sports medicine and orthopaedics. Self-reported patient outcomes are typically collected by administering a reliable ques-

tionnaire after an injury. The questionnaire routinely asks a patient to rate his or her self-perceived ability to perform activities of daily living or more challenging tasks, such as sport or recreational activities (eg, running, pivoting, throwing). Traditionally, these measures are obtained at the initial injury evaluation and periodically throughout treatment or at least at discharge to determine if progress is occurring. Ultimately, a final set of measurements helps the clinician determine if an appropriate amount of change has occurred from initial evaluation to the end of rehabilitation so the clinician can discharge the patient from care. However, considering that the clinical goal is to return the patient to the preinjury level of performance, how the individual athlete perceived himself or herself before the injury occurred is important to know. This gap has been evident in previous case series in which authors<sup>6–11</sup> have reported return-to-participation rates or return-to-preinjury levels of athletic performance based on asking patients 2 years or more after discharge if they had returned to preinjury levels of activity. The lack of a prospective subjective or objective assessment of preinjury baseline capability decreases the ability to confirm if the athlete has returned to the preinjury level of activity. Unfortunately, retrospective assessments in case-series reports are often limited in interpretation because of the possibility of recall bias given the length of time from injury to end of treatment to clinical follow-up.

In a recent cross-sectional study, Cameron et al<sup>12</sup> obtained prospective outcome scores for incoming military cadets with and without a history of knee-ligament injury. Individuals with a history of knee-ligament injury had lower scores (0- to 12-point difference in median value) than individuals who did not have an injury history per the Knee Injury and Osteoarthritis Outcome Score (KOOS).<sup>12</sup> These results helped to identify a potential relationship between previous injury and current lower level of perceived physical capability after supposed injury resolution. However, given that the authors focused on 1 anatomical joint and 1 distinct population, it would be beneficial to know if a specific history of injury to different anatomical joints has a similar effect on the perceived physical capability of a heterogeneous population. Therefore, the primary purpose of our study was to perform a descriptive analysis of perceived measures of physical capability for the knee, shoulder, and elbow during preparticipation physical examinations for collegiate athletes. Self-perceived physical capability was assessed by distributing selected subscales of the KOOS questionnaire and the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow (KJOC) Score. The secondary purpose of our study was to investigate potential differences in outcome scores between individuals with and without injury histories. We hypothesized that athletes with a history of injury would have lower outcome scores, indicating decreased perceived physical capability when performing sport activities.

## METHODS

### Design and Setting

To answer the primary question, we conducted a cross-sectional study to assess preseason self-perceived physical capability specific to athletes. We used a cross-sectional

design to evaluate differences in knee, shoulder, and elbow scores between athletes with and without a self-reported upper or lower extremity injury history during preseason physical examinations. The knee, shoulder, and elbow were selected as anatomical joints of interest because more than 75% of the injuries treated in the primary author's facility occur at or around these joints.

### Participants

Athletes were recruited from 5 institutions (3 National Association of Intercollegiate Athletics institutions and 1 each from National Collegiate Athletic Association Divisions I and III institutions) currently receiving physician or athletic training services from the primary or senior author's facilities. Each athlete was asked to complete a hard-copy survey packet during the preseason preparticipation physical examination; the data were included if he or she was cleared medically to participate in sport per the team physician. Volunteers were excluded if they were being treated for a musculoskeletal injury that prevented them from participating in athletics or if they were not medically cleared to participate in sport via the physical examination. The research team was invited to attend select physical examination dates, which each school's athletic training and medical staff provided, through the middle to late summer before the beginning of the fall sports season, when the largest number of physical examinations would be conducted. Participant recruitment and survey completion occurred only by the research team at the attended physical examinations. We briefed participants on the purpose of the surveys and any potential risks and gave them the option of being excluded from the study. They were also informed that no identifiable protected health information would be collected. The study was granted a waiver for informed consent because identifiable protected health information would not be collected and was approved by the Institutional Review Board of Lexington Clinic.

### Study Questionnaires

After having a physical examination by a team physician and receiving medical clearance to participate in sport, each athlete was instructed to complete a general information demographic form that included age, years participating in the present sport, sex, history of injury, and sport. History of injury was questioned in a binary fashion (*yes* or *no*) for the 3 anatomical joints of interest: knee, shoulder, and elbow (eg, "Have you ever had a shoulder injury?"). Unlike previous work<sup>13</sup> in which *history of injury* was specifically defined as the loss of at least 1 day of athletic participation or an event requiring medical attention, we intentionally wanted to avoid hindering individual perception, thereby allowing personal experiences to influence the survey responses. Using patient experiences as defined by the individual was believed to reflect daily clinician-patient interaction during a clinical assessment. Therefore, *injury* was defined as "any event an individual could recall that he or she would personally consider to be an episode of injury but not necessarily sustained during participation in athletics," which fit the purpose of the study.<sup>14</sup>

In addition to the demographic information, participants were instructed to complete 2 self-reported outcomes questionnaires: KOOS<sup>15</sup> and KJOC.<sup>16</sup> We selected these

questionnaires because they could be applied across multiple sports and because no single questionnaire would be ideal for all sports. They were also selected for their applicability to the knee (KOOS) and shoulder and elbow (KJOC) and their usefulness in gauging sport-specific maneuvers in athletes rather than the performance of less rigorous activities of daily living. *Self-perceived physical capability* was defined as the individual player's view of his or her ability to perform athletic tasks based on the current personal view of the specific joint. We did not modify the instructions for or questions of the KOOS subscales or the KJOC from their original constructs.

The KOOS contains 5 subsections that ask participants to rate their relative status regarding symptoms, pain, activities of daily living, sports and recreation, and knee-related quality of life.<sup>15</sup> Each subsection comprises a series of 5-point Likert scales that are transformed to be read from 0 to 100 (100 = *high level of physical capability* or "*best*" score) and are scored separately. For the purposes of our study, we selected only the Sports and Recreation Function (KOOS<sub>Sport</sub>) and Knee-Related Quality of Life (KOOS<sub>QOL</sub>) sections because of their relevance to athletic populations and because each section of the KOOS can be scored and interpreted separately. Given our hypothesis that existing knee conditions could psychologically affect knee-specific activities, we selected the KOOS<sub>QOL</sub> as a means of capturing this phenomenon. Roos et al<sup>15</sup> reported that the reliability of the KOOS<sub>Sport</sub> (intraclass coefficient = 0.81, measurement error = 8.3 points) and KOOS<sub>QOL</sub> (intraclass coefficient = 0.86, measurement error = 5.6 points) are excellent.

The KJOC comprises 10 individual questions scored via visual analogue scales that are 10 cm long. The results of the 10 questions are summed, and the total score is reported from 0 to 100 (100 = *high level of physical capability* or "*best*" score). This questionnaire has been found to be sensitive to athletes in overhead sports,<sup>16</sup> but we selected it because of its specific questions about upper extremity athletic performance and because it is the most specific upper extremity athletic performance instrument available to date. The KJOC has a reported intraclass correlation coefficient of 0.88 and measurement errors of 3 points for previous shoulder injury and 4 points for previous elbow injury.<sup>16</sup>

### Data Reduction

The research team manually entered all paper questionnaire data into an electronic database. Using previously established methods,<sup>15</sup> we transformed the KOOS item scores from the Likert-scale categories to integers of 0 to 4, which allowed the score for each section to be calculated on a scale from 0 to 100. The KJOC visual analogue scales were measured manually with a standard tape measure to the nearest 0.1 cm. The scores for all 10 questions were combined for a total score from 0 to 100.

### Statistical Analysis

Summary statistics for demographic items were calculated and reported as means and standard deviations for continuous variables, and frequencies and percentages were reported for categorical variables. For the primary purpose, the summary values for knee, shoulder, and elbow self-

reported physical capability were obtained by calculating summary statistics for all athletes, consisting of mean score, standard deviation, 95% confidence interval, median score, interquartile range, minimum and maximum scores, and ceiling effects. For the secondary purpose, we conducted 4 planned comparisons, examining the self-reported scores between individuals with and without a history of injury for each anatomical joint and the appropriate outcomes instrument (KOOS<sub>Sport</sub>: knee; KOOS<sub>QOL</sub>: knee; KJOC: shoulder and elbow). Normality was examined using a Shapiro-Wilk test, which indicated that the study variables were not normally distributed ( $P < .001$ ). Therefore, 4 independent nonparametric Mann-Whitney  $U$  analyses were performed to identify the differences between injury history and each self-perceived score (KOOS<sub>Sport</sub> score: knee-injury history; KOOS<sub>QOL</sub> score: knee-injury history; KJOC score: shoulder-injury history; KJOC score: elbow-injury history). To differentiate between participants with and without a history of shoulder or elbow injury on the KJOC, each condition needed to exist separately; therefore, when comparing participants with and without a history of shoulder injury, we excluded participants who also reported a history of elbow injury from the analysis. Similarly, when comparing participants with and without a history of elbow injury, participants who also reported a history of shoulder injury were excluded. In addition, pairwise Cohen  $d$  calculations were performed to determine the relative effect size of any differences in outcome scores.<sup>17</sup> The effect size is often used to determine if mean differences are large enough to be considered clinically meaningful; Cohen defined effect sizes as *small* (0.2), *medium* (0.5), and *large* (0.8).<sup>17,18</sup> Participants with missing data were not included in the analyses. We performed all statistical calculations using STATA/IC (version 13.1; StataCorp, LP, College Station, TX). The  $\alpha$  level was set at .05.

### RESULTS

Demographic information was obtained from 738 athletes at 5 collegiate institutions participating in 19 sports (Table 1). The greatest number of athletes actively participated in football and represented 29% of the athletes surveyed (Table 2). Among the 350 athletes who reported a history of injury, a total of 445 injuries were noted: a previous knee injury in 208, a previous shoulder injury in 180, and a previous elbow injury in 57. The median values for the KOOS<sub>Sport</sub>, KOOS<sub>QOL</sub>, and KJOC for all 738 athletes were 100 (Table 3). Athletes with previous joint injuries reported less perceived physical capability ( $P < .001$ ) on both KOOS subscales and the KJOC (Table 4). The effect sizes for the differences were large, ranging from 0.89 to 1.4 for the KOOS subscale scores and from 1.2 to 1.3 for the KJOC scores.

### DISCUSSION

Self-reported outcome questionnaires are used regularly to assess a person's current perceived ability to perform activities of daily living or more demanding tasks, such as maneuvers performed in athletics.<sup>15,16,19–21</sup> These questionnaires are often initially distributed at the start of rehabilitation (ie, when the person is injured) and assist clinicians in measuring changes as the person progresses through the recovery process, culminating with discharge

**Table 1. Descriptive Statistics for Demographic Variables<sup>a</sup>**

Variable	Overall (N = 738)	No Injury History (n = 388)	Injury History (n = 350)
Age			
No.	735	386	349
Mean $\pm$ SD, y	19 $\pm$ 1	19 $\pm$ 1	19 $\pm$ 1
Range, y	17–32	17–24	17–32
Time playing sport			
No.	707	370	337
Mean $\pm$ SD, y	10 $\pm$ 4	10 $\pm$ 4	11 $\pm$ 4
Range, y	1–20	1–19	1–20
Sex, No. (%)			
Male	486 (66)	248 (64)	238 (68)
Female	251 (34)	140 (36)	111 (32)
Year in college, No. (%)			
Freshman	59 (8)	32 (9)	27 (8)
Sophomore	498 (69)	278 (73)	220 (64)
Junior	84 (12)	34 (9)	50 (14)
Senior	68 (9)	28 (7)	40 (12)
5th-year senior or graduate	14 (2)	7 (2)	7 (2)
Knee injury ever? No. (%)			
Yes	208 (28)		
No	529 (72)		
Shoulder injury ever? No. (%)			
Yes	180 (24)		
No	557 (76)		
Elbow injury ever? No. (%)			
Yes	57 (8)		
No	681 (92)		

<sup>a</sup> Not all individuals provided answers for all questions.

from formal treatment and return to the individual's desired activity. Return to athletic activity after rehabilitation often carries the expectation of returning to the preinjury level of play; however, measures of self-perceived ability to perform athletic tasks before the exposure to injury are limited.<sup>12,22–24</sup> Thus, we conducted this study to identify baseline self-reported physical capability relative to the perceived state of the knee, shoulder, and elbow in a wide array of athletes before injury exposure.

Our first main finding was that overall, collegiate athletes reported upper-level scores on selected KOOS subscales and the KJOC that were similar to values previously reported in the literature.<sup>12,16,22,24</sup> The fact that most athletes in our study reported high and often perfect scores was not unexpected, as they were instructed to complete the questionnaires at a time when they were assumed to be unaffected by injury. In addition, the athletes were cleared medically by the team physician(s) before completing the questionnaires, adding another level of expectation for high scores. However, whereas we obtained self-perceived scores for a heterogeneous group of athletes and we aimed to identify group characteristics, results specific to an individual athlete may be more appropriate for making accurate clinical decisions about that person, as group scores could mask individual concerns.<sup>1,22</sup>

**Table 2. Sport Distribution for All Athletes by Sex, No. (%)<sup>a</sup>**

Sport	Overall	Sex	
		Male	Female
Football	213 (29.0)	213 (100)	0 (0)
Soccer	146 (20.0)	89 (61)	57 (39)
Baseball	63 (8.0)	63 (100)	0 (0)
Basketball	54 (7.0)	35 (65)	19 (35)
Volleyball	47 (6.4)	0 (0)	47 (100)
Swimming	36 (4.5)	17 (47)	19 (53)
Wrestling	31 (4.0)	19 (61)	12 (39)
Softball	27 (4.0)	0 (0)	27 (100)
Cross-country	18 (2.4)	9 (50)	9 (50)
Archery	16 (2.0)	8 (50)	8 (50)
Golf	16 (2.2)	7 (44)	9 (56)
Bowling	14 (2.0)	6 (46)	8 (54)
Lacrosse	13 (2.0)	12 (92)	1 (8)
Field hockey	13 (2.0)	0 (0)	13 (100)
Cheerleading	11 (1.5)	0 (0)	11 (100)
Tennis	10 (1.4)	6 (60)	4 (40)
Track	6 (1.0)	2 (33)	4 (67)
Equestrian	2 (0.3)	0 (0)	2 (100)
Dance	2 (0.3)	0 (0)	2 (100)

<sup>a</sup> Percentages were rounded.

After athletes were categorized by injury history, we noted that the high overall scores decreased in those with a previous injury, despite all study participants' having received medical clearance to compete in their sports. The reduction in score was more evident for participants with previous knee injuries as measured by the KOOS<sub>QOL</sub> and those with previous shoulder injuries as measured by the KJOC. These findings suggested that previous injury indeed can negatively affect an individual's perceived physical capability. The meaningfulness of an identified relationship between injury history and perceived physical capability is strengthened by the observed differences, which exceeded reported measurement errors for the outcome instruments, as well as the resultant large effect sizes.

In several investigations,<sup>12,23,24</sup> researchers have shown that certain active groups with injury histories also have lower outcome scores and increased symptoms both before and after physical activity. Active professional baseball players and military cadets with injury histories have lower perceived outcome scores as assessed via the same questionnaires used in this study.<sup>12,24</sup> Similarly, using different upper extremity questionnaires (including the Rowe Shoulder Score, the Simple Shoulder Test, the American Shoulder and Elbow Surgeons Score, the Constant-Murley Shoulder Score, and the UCLA End-Result Score), researchers<sup>23</sup> conducting a midseason assessment of uninjured collegiate athletes observed an increased incidence of shoulder-related symptoms in those with previous injuries. These findings highlight the importance of comprehensively screening all athletes because traditional medical qualification does not necessarily account for the individual player's perception of his or her ability to perform dynamic athletic maneuvers, whether basic (forward running or jumping) or complex (throwing, striking, or cutting). With the current paradigm shift from the biomedical focus (disease-driven clinical care) to the biopsychosocial focus (patient as an active participant),<sup>25</sup> we recommend parallel screening involving

**Table 3. Descriptive Analysis of Perceived Physical Capability for Entire Sample**

Questionnaire	No.		Score		
	Participants	Missing	Mean $\pm$ SD	Median	Possible Range
Knee Injury and Osteoarthritis Outcome Score					
Sport and Recreation Function	730	8	94 $\pm$ 13	100	10–100
Knee-Related Quality of Life	727	11	92 $\pm$ 15	100	6.25–100
Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score	734	4	94 $\pm$ 11	100	17–100

both the traditional medical examination and the assessment of self-perceived physical capability to provide a broader view of the individual person and factors that could negatively affect physical performance or well-being. Furthermore, supplementing the patient-reported outcome measures with some assessment of injury history would likely provide clinicians with more information about why a specific magnitude of outcome score resulted.

Researchers<sup>26–28</sup> have also established that a predictor of future injury is past injury, so prospective assessment of injury history and perceived physical capability may help clinicians identify athletes at risk for future injury. This work has been pivotal in identifying factors that contribute to injury risk; however, prospective assessment of perceived physical capability via the questionnaires we used has not been applied to predicting injury. The combination of an injury-history questionnaire and a patient-reported outcome measure, such as the KOOS or KJOC, might identify a previously injured athlete who can participate in his or her sport but who does not believe that the affected knee or shoulder is functioning optimally based on the previous injury experiences. The prospective method of assessment could help identify potential impairments possibly resulting from incomplete recovery or rehabilitation from past injury. In addition, identifying players with previous injuries and their perceived abilities to perform physically could allow clinicians to efficiently develop

athlete-specific injury-prevention programs; identifying scores below a certain threshold for specific athletes rather than an entire team may help individualize treatment plans. Whereas it is beyond the scope of our findings, future researchers could investigate if athletes who have previous injuries perceive their physical performance capabilities to be less than reported reference values and are at greater risk for future injury.

Loosely defining the term *injury* allowed each participant to define injury in his or her personal context and was a potential limitation of this study. The broad description allowed each participant to use his or her own perception and definition of what an injury was. We opined that injury could occur at any place or any time and was not necessarily specific to sports, such as when an athlete was not practicing or competing (ie, the off-season); therefore, restricting the definition to missed participation time or only conditions for which medical treatment was sought would potentially eliminate personal or contextual definitions of *injury*.<sup>14</sup> The self-reported values detailed in this study showed that however an individual chose to define it, an *injury* was important enough for the occurrence to be recalled and to produce a difference in the reported scores for both upper and lower extremity questionnaires. Our findings are interpreted most appropriately as showing a connection between reporting a lower level of perceived physical capability relative to a predetermined “best”

**Table 4. Comparison of Perceived Physical Capability by History of Injury**

Instrument	No.	Mean $\pm$ SD		<i>P</i>	Effect Size		Minimum	Maximum	Interquartile	Ceiling
		(95% Confidence Interval)			Value	Confidence Interval)				
Injury History						Median	Value	Value		
Kerlan-Jobe Orthopaedic Clinic										
Shoulder and Elbow Score										
Shoulder injury ever	180	85 $\pm$ 8 (83, 88)	<.001	1.2 (1.0, 1.4)	93	17	100	22	22	
No shoulder injury ever	516	98 $\pm$ 5 (97, 98)			100	50	100	3	53	
Kerlan-Jobe Orthopaedic Clinic										
Shoulder and Elbow Score										
Elbow injury ever	57	89 $\pm$ 14 (85, 93)	<.001	1.3 (1.0, 1.6)	97	46	100	16	25	
No elbow injury ever	516	98 $\pm$ 5 (97, 98)			100	50	100	3	53	
Knee Injury and Osteoarthritis										
Outcome Score Sport and Recreation Function Subscale										
Knee injury ever	208	86 $\pm$ 18 (84, 89)	<.001	0.9 (0.7, 1.1)	95	30	100	25	44	
No knee injury ever	521	97 $\pm$ 9 (96, 98)			100	10	100	0	81	
Knee Injury and Osteoarthritis										
Outcome Score Quality of Life Subscale										
Knee injury ever	208	80 $\pm$ 20 (77, 82)	<.001	1.4 (1.2, 1.5)	88	6.25	100	31	29	
No knee injury ever	518	97 $\pm$ 8 (96, 98)			100	44	100	0	83	

score and having sustained a previous injury to the knee, shoulder, or elbow. Yet the exact values in this report should not be used as cut points for making clinical decisions about the ability or inability to perform athletic tasks. In future studies, researchers should further investigate the clinical utility of the self-reported measures provided by athletes before a competitive season begins.

Our study had other potential limitations. First, the KJOC has 1 question related to pain but does not have a specific pain score or section, whereas other sections of the KOOS, which we did not use, provide scores for symptoms and for pain. Given the lack of a specific symptoms or pain score on the KJOC, we decided not to distribute those same subsections of the KOOS so we could capture similar information on the 2 questionnaires. We also decided not to administer all KOOS subsections so we could focus on specific components most relevant to athletes (ie, questions specific to perceived physical capability). We believed the primary study question could be answered appropriately in the executed manner because each section of the KOOS can be scored and interpreted separately. Second, the binary design of the injury history questions does not account for severity of pain or injury, type of injury, or duration of injury. Variations in perceived physical capability were possibly related to these components; however, all athletes were cleared medically to participate in sport, and no important examination finding that would have otherwise disqualified an athlete from participation was noted. Third, we did not obtain rehabilitation history or specific information about treatment. Responses could have been affected by previous experiences with rehabilitation (if any), including number of treatments or visits, access to clinical care, and mode of treatment. We recognized that, whereas the athletes were qualified medically to participate in their sports, physical deficits, impairments, or joint derangement could have been present and in varying severities. Despite these limitations, the method of assessment for self-reported physical capability specific to athletics in this study mimicked clinical practice, whereby clinicians select questionnaires based on a litany of factors, including the patient component in the rehabilitation process, with the understanding that not all potential confounding variables can be accounted for in clinical practice.

## CONCLUSIONS

Similar to previous literature, our observations showed that overall, perceived physical capability specific to the knee, shoulder, and elbow was high for athletes before a competitive season began. However, athletes reporting a previous injury had lower perceived physical capability before a competitive season. This self-assessment of joint-specific capability may supplement preseason physical examinations and indicate that particular athletes need further monitoring or care during the season. Although this has not yet been determined, prospective collection and use of preseason perceived physical capability may guide goal setting in rehabilitation and return to participation, providing a patient-specific measure on which clinicians can base clinical decisions.

## REFERENCES

- Sciascia AD. A basic construct for improving outcomes in rehabilitation. *Int J Athl Ther Train*. 2013;18(3):14–19.
- Vela LI. Using a disablement model in the athletic training room. *Athl Ther Today*. 2008;13(1):40–44.
- Snyder AR, Parsons JT, Valovich McLeod TC, Curtis Bay R, Michener LA, Sauers EL. Using disablement models and clinical outcomes assessment to enable evidence-based athletic training practice, part I: disablement models. *J Athl Train*. 2008;43(4):428–436.
- Valovich McLeod TC, Snyder AR, Parsons JT, Curtis Bay R, Michener LA, Sauers EL. Using disablement models and clinical outcomes assessment to enable evidence-based athletic training practice, part II: clinical outcomes assessment. *J Athl Train*. 2008;43(4):437–445.
- Parsons JT, Snyder AR. Health-related quality of life as a primary clinical outcome in sport rehabilitation. *J Sport Rehabil*. 2011;20(1):17–36.
- Kim SH, Ha KI, Kim SH, Choi HJ. Results of arthroscopic treatment of superior labral lesions. *J Bone Joint Surg Am*. 2002;84(6):981–985.
- Cohen DB, Coleman S, Drakos MC, et al. Outcomes of isolated type II SLAP lesions treated with arthroscopic fixation using a bioabsorbable tack. *Arthroscopy*. 2006;22(2):136–142.
- Neuman BJ, Boisvert CB, Reiter B, Lawson K, Ciccotti MG, Cohen SB. Results of arthroscopic repair of type II superior labral anterior posterior lesions in overhead athletes: assessment of return to preinjury playing level and satisfaction. *Am J Sports Med*. 2011;39(9):1883–1888.
- Cohen SB, Sheridan S, Ciccotti MG. Return to sports for professional baseball players after surgery of the shoulder or elbow. *Sports Health*. 2011;3(1):105–111.
- Smith FW, Rosenlund EA, Aune AK, MacLean JA, Hillis SW. Subjective functional assessments and the return to competitive sport after anterior cruciate ligament reconstruction. *Br J Sports Med*. 2004;38(3):279–284.
- Arderm CL, Webster KE, Taylor NF, Feller JA. Return to the preinjury level of competitive sport after anterior cruciate ligament reconstruction surgery: two-thirds of patients have not returned by 12 months after surgery. *Am J Sports Med*. 2011;39(3):538–543.
- Cameron KL, Thompson BS, Peck KY, Owens BD, Marshall SW, Svoboda SJ. Normative values for the KOOS and WOMAC in a young athletic population: history of knee ligament injury is associated with lower scores. *Am J Sports Med*. 2013;41(3):582–589.
- Swenson DM, Yard EE, Fields SK, Comstock RD. Patterns of recurrent injuries among US high school athletes, 2005–2008. *Am J Sports Med*. 2009;37(8):1586–1593.
- Clarsen B, Bahr R. Matching the choice of injury/illness definition to study setting, purpose, and design: one size does not fit all! *Br J Sports Med*. 2014;48(7):510–512.
- Roos EM, Roos HP, Lohmander LS, Ekdahl C, Beynon BD. Knee Injury and Osteoarthritis Outcome Score (KOOS): development of a self-administered outcome measure. *J Orthop Sports Phys Ther*. 1998;28(2):88–96.
- Alberta FG, ElAttrache NS, Bissell S, et al. The development and validation of a functional assessment tool for the upper extremity in the overhead athlete. *Am J Sports Med*. 2010;38(5):903–911.
- Cohen J. The analysis of variance and covariance. In: *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates Inc; 1988:273–406.
- Dunlop W, Cortina J, Vaslow J, Burke M. Meta-analysis of experiments with matched groups or repeated measures designs. *Psychol Methods*. 1996;1(2):170–177.
- Hudak PL, Amadio PC, Bombardier C. Development of an upper extremity outcome measure: the DASH (Disabilities of the Arm, Shoulder, and Hand). *Am J Ind Med*. 1996;29(6):602–608.

20. Leggin BG, Michener LA, Shaffer MA, Brenneman SK, Iannotti JP, Williams GR. The Penn shoulder score: reliability and validity. *J Orthop Sports Phys Ther.* 2006;36(3):138–151.
21. Richards RR, An KN, Bigliani LU, et al. A standardized method for the assessment of shoulder function. *J Shoulder Elbow Surg.* 1994;3(6):347–352.
22. Kraeutler MJ, Ciccotti MG, Dodson CC, Frederick RW, Cammarota B, Cohen SB. Kerlan-Jobe Orthopaedic Clinic overhead athlete scores in asymptomatic professional baseball pitchers. *J Shoulder Elbow Surg.* 2013;22(3):329–332.
23. Soldatis JJ, Moseley JB, Etminan M. Shoulder symptoms in healthy athletes: a comparison of outcome scoring systems. *J Shoulder Elbow Surg.* 1997;6(3):265–271.
24. Franz JO, McCulloch PC, Kneip CJ, Noble PC, Linter DM. The utility of the KJOC score in professional baseball in the United States. *Am J Sports Med.* 2013;41(9):2167–2173.
25. Adams JR, Drake RE. Shared decision-making and evidence-based practice. *Community Ment Health J.* 2006;42(1):87–105.
26. Gabbe BJ, Bennell KL, Finch CF, Wajswelner H, Orchard JW. Predictors of hamstring injury at the elite level of Australian football. *Scand J Med Sci Sports.* 2006;16(1):7–13.
27. Jacobsson J, Timpka T, Kowalski J, et al. Injury patterns in Swedish elite athletics: annual incidence, injury types and risk factors. *Br J Sports Med.* 2013;47(15):941–952.
28. de Noronha M, Franca LC, Haupenthal A, Nunes GS. Intrinsic predictive factors for ankle sprain in active university students: a prospective study. *Scand J Med Sci Sports.* 2013;23(5):541–547.

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